

WHAT IS CLAIMED

1. An EGR control device for diesel engine, wherein part of exhaust gas is recirculated into an air intake passage of said diesel engine, said EGR control device comprising:

5 a throttle valve for controlling an opening of said air intake passage under EGR control;

an EGR valve for controlling a flow rate of exhaust gas recirculated into said air intake passage;

10 a first air intake body equipped with said throttle valve, a drive motor thereof and a reduction gear mechanism; and

a second air intake body into which an exhaust gas recirculation passage part with said EGR valve is incorporated, and which is equipped with a drive motor of said EGR valve and a reduction gear mechanism;

15 wherein said first and second air intake bodies are connected to each other as a single-assembly, and are provided with a first and second covers for covering corresponding said reduction gear mechanisms, respectively; and a circuit board for driving and controlling at least said throttle valve is
20 incorporated in at least one of said first and second covers.

2. The EGR control device according to Claim 1, wherein said throttle valve is used for at least one of prevention of dieseling and regeneration of a diesel particulate filter
25 other than EGR control.

3. The EGR control device according to Claim 1, wherein said circuit board for controlling said throttle valve and EGR valve is composed of a single board.

5 4. The EGR control device according to Claim 1, wherein said device is configured to send EGR valve control signal produced by said circuit board to the drive motor of said EGR motor through from a connector terminal provided on said first cover to a connector terminal provided on said second cover.

10 5. The EGR control device according to Claim 1, wherein said circuit board is configured to take in a signal of a target EGR rate sent from a high-order engine control unit arranged outside said covers, and to compute a throttle valve opening and an EGR valve opening required under EGR control
15 based on said target EGR rate.

20 6. An EGR control device for diesel engine, wherein part of exhaust gas is recirculated into an air intake passage of said diesel engine, said EGR control device comprising:

 a throttle valve for controlling an opening of said air intake passage under EGR control;

 an EGR valve for controlling a flow rate of exhaust gas recirculated into said air intake passage;

25 a throttle body equipped with said throttle valve, a

drive motor thereof and a reduction gear mechanism;

a resin cover attached on said throttle body for covering said reduction gear;

a circuit board incorporated into said resin cover for driving and controlling said throttle valve;

a step down circuit installed on said circuit board for stepping down a battery voltage into a motor power supply voltage.

10 7. An EGR control device for diesel engine, wherein part of exhaust gas is recirculated into an air intake passage of said diesel engine, said EGR control device comprising:

a throttle valve for controlling an opening of said air intake passage under EGR control;

15 an EGR valve for controlling a flow rate of exhaust gas recirculated into said air intake passage;

a throttle body equipped with said throttle valve, a drive motor thereof and a reduction gear mechanism;

20 a resin cover attached on said throttle body for covering said reduction gear; and

a circuit board incorporated into said resin cover for driving and controlling said throttle valve;

25 wherein said circuit board is mounted on a heat sink having a higher thermal conductivity than that of said resin cover; said heat sink is installed in said resin cover in such

a manner of being led through said resin cover; and a heat radiation surface of said heat sink is exposed to the outside.

8. The EGR control device according to Claim 7, wherein
5 said circuit board is equipped with a circuit for driving and controlling said EGR valve, in addition to said throttle valve.

9. The EGR control device according to Claim 7, wherein
said heat sink is provided with a cooling water pipe.

10

10. An EGR control device for diesel engine, wherein
part of exhaust gas is recirculated into an air intake passage
of said diesel engine, said EGR control device comprising:

a throttle valve for controlling an opening of said air
15 intake passage under EGR control;

an EGR valve for controlling a flow rate of exhaust gas
recirculated into said air intake passage;

a throttle body equipped with said throttle valve, a
drive motor thereof and a reduction gear mechanism;

20 a resin cover attached on said throttle body for covering
said reduction gear;

a circuit board incorporated into said resin cover for
driving and controlling said throttle valve; and

a diesel particulate filter installed on an exhaust gas
25 passage of said diesel engine;

wherein said circuit board is provided with a circuit for controlling the opening of said throttle valve to burn particulate substance deposited on said diesel particulate filter.

5

11. The EGR control device for diesel engine described in Claim 10, wherein said circuit board is equipped with a circuit for driving and controlling the EGR valve, in addition to said throttle valve.

10

12. A motor driven throttle valve device comprising:
a throttle valve for controlling an opening of an air intake passage of an internal combustion engine under EGR control;

15

an EGR valve for controlling a flow rate of exhaust gas recirculated into said air intake passage;

a first air intake body equipped with said throttle valve, a drive motor thereof and a reduction gear mechanism; and

20

a second air intake body into which an exhaust gas recirculation passage part with said EGR valve is incorporated, and which is equipped with a drive motor of said EGR valve and a reduction gear mechanism;

25

wherein said second air intake body is connected to said first air intake body in series at downstream from said first air intake body; said first and second air intake bodies are

provided with a first and second covers for covering reduction gear mechanisms respectively; a throttle valve shaft and an EGR valve shaft are arranged in parallel in the vertical direction; and said reduction gears for these shafts and said first and second covers are arranged in parallel on the side surface of said first and second air intake bodies.

13. The motor driven throttle valve device according to Claim 12, wherein said first and second covers are separately or integrally molded.

14. The motor driven throttle valve device according to Claim 12, wherein said first cover is provided with a sensor for sensing the opening of said throttle valve, whereas said second cover is provided with a sensor for sensing the opening of said EGR; and said first and second covers are provided with connectors containing at least an output terminal for sending a signal from each sensor to an engine control unit, a terminal for supplying power to said drive motor, a ground terminal and an input terminal for taking in control signals for each valves.

15. The motor driven throttle valve device according to Claim 14, wherein said connector is oriented upstream from said throttle valve.

16. A motor driven throttle valve device comprising:

a throttle body forming an air intake passage;

a throttle valve installed into said air intake passage

5 to reduce an cross section of said air intake passage
according to an engine operation mode;

a throttle valve shaft supported by said throttle body,
said throttle valve being fixed on said throttle valve shaft;

a motor mounted on said throttle body ;

10 a reduction gear mechanism for transmitting a rotation of
said motor to said throttle valve shaft;

a resin cover attached on said throttle body so as to
cover the gear mechanism;

a control circuit installed into said resin cover;

15 a connector provided integrally with terminals provided
on said resin cover by insert-molding to output an EGR valve
control signal sent from said control circuit.

17. The motor driven throttle valve device according to
20 Claim 16, wherein said connector includes a terminal for
receiving the signal indicating the status of said engine used
to compute the EGR valve control signal.

18. The motor driven throttle valve device according to
25 Claim 16, wherein the output signal of a throttle position

sensor for sensing the rotational angle of said throttle valve shaft is inputted into said control circuit.

19. The motor driven throttle valve device according to
5 Claim 16, wherein said connector contains a terminal for
outputting to the outside the output signal of said throttle
position sensor which senses the rotational angle of said
throttle valve shaft.